

## SHORT COMMUNICATIONS

### Misdirected incubation in American Kestrels: a case of competition for nest sites?—

Reports of birds exhibiting unusual incubation behaviors are perhaps not surprising, given the wide variety of physical properties that can elicit incubation responses in birds (see Baerends and Drent 1982). Birds that normally are solitary nesters occasionally have been documented sharing the same nest site (Terres 1982, Fournier and Hines 1996). Parent birds have also inadvertently hatched or raised offspring of a different species (Tlustý and Hamerstrom 1992, Breen and Parrish 1996). When nest sharing or cases of parent birds raising non-conspecific offspring occur, it frequently is assumed to be the result of competition for nest sites (e.g., Simpkin and Gubanich 1991). Here we report on the multiple use of a nest box. Two pairs of American Kestrels (*Falco sparverius*) and a Bufflehead (*Bucephala albeola*) occupied this nest box during the season, suggesting intense competition for this particular site, despite the fact that natural cavities do not appear to be limiting on our study area (Bortolotti 1994; pers. obs.), and that there were several nest boxes in the vicinity that were unoccupied. Use of this nest box by kestrels and Buffleheads, both secondary cavity nesters, resulted in an unusual event where by a pair of kestrels successfully incubated and hatched a Bufflehead egg in addition to their own clutch.

**Methods.**—We have studied American Kestrels in the boreal forest of north central Saskatchewan (55°N, 106°W) in the vicinity of Besnard Lake since 1988. Kestrels arrived on our study area in mid- to late April and began laying eggs in mid-May. Nest boxes contained a few centimeters of wood shavings, and we visited boxes in late April to evict red squirrels (*Tamiasciurus hudsonicus*) that frequently occupy nest boxes during the winter. We again checked nest boxes approximately every three to five days between mid-May and mid-June to determine laying date. Further details of our general methods can be found elsewhere (Bortolotti 1994, Dawson and Bortolotti 1997).

**Observations.**—On 27 April, 1996, a red squirrel was found in a nest box along with a grass nest. Both the squirrel and its nest were removed. Two days later, a squirrel and a grass nest were again removed from the nest box. The next visit occurred on 14 May and, although no kestrels were seen in the area, the presence of a scrape in the wood shavings lining the nest box suggested that the territory was occupied by kestrels. We levelled the scrape in the wood shavings before leaving. Upon approaching the nest box five days later (19 May), a color-banded female kestrel flushed from the nest, although we did not ascertain her identity. A scrape with no eggs was found during that visit.

During the next visit on 24 May, we found one large egg in the box that was undoubtedly laid by a duck. No ducks or kestrels were sighted in the area. The duck egg was olive-buff in color and measured 53.5mm by 36.6mm, which suggests it was laid by a Bufflehead (see Bellrose 1976). Expecting to find an incubating female Bufflehead when we returned to the nest on 15 June, we were surprised by the presence of an unbanded female kestrel in an incubating posture. Upon lifting the kestrel from the eggs to band her, we noted that she was not only incubating four of her own eggs but also the duck egg. RDD estimated by candling (Weller 1956) that the duck egg was in its 7th to 9th day of incubation. The female kestrel was placed back on the eggs and was again incubating all five eggs during a visit on 25 June.

On 1 July, the male kestrel was captured while incubating the four kestrel eggs and a single duck egg. This male was previously banded and was at least three years old. He had bred successfully in nearby nest boxes during 1994 and 1995. On this visit, the duck egg

was estimated to be in its 22nd day of incubation. On 4 July, the female kestrel was present and three of four kestrel eggs had star cracks. The duck egg had 25 days of incubation. Two kestrel chicks had hatched by 6 July and were being brooded by the female kestrel. On 8 July, the duck egg had reached the pipping stage, and the remaining two kestrel eggs had star cracks but appeared to be dead. A visit on 9 July revealed that the duckling was nearly emerged from its egg. On 10 July, the nest contained two kestrel chicks approximately five days old plus the day-old duckling. The duckling on this visit was highly mobile and repeatedly attempted to jump up towards the nest box hole. The duckling was not present in the nest box on 12 July, and we could find no evidence that it had been killed by the kestrels (i.e., no prey remains). Because of its highly mobile nature on the previous visit, we suspect that the duckling left the nest box on its own accord. The remaining two unhatched kestrel eggs were removed during this visit and found to contain fully developed embryos that died just prior to hatching. The remaining two kestrel chicks fledged normally several weeks later.

*Discussion.*—We find it remarkable that this pair of kestrels was able to incubate the duck egg and two kestrel eggs, as well as incubate two other kestrels eggs nearly to hatching. Using Hoyt's (1979) equation, we calculated the volume of the Bufflehead egg to be 36.5 cm<sup>3</sup>, while the average egg volume of the four kestrel eggs in this nest was 12.7 cm<sup>3</sup>. The total egg volume that the kestrels incubated in this nest was therefore 87.3 cm<sup>3</sup>, the equivalent of nearly seven kestrel eggs. Kestrels potentially have difficulty incubating a normal clutch of five kestrel eggs, and clutches of six kestrel eggs, which are relatively rare, frequently experience partial hatching failure (Wiebe and Bortolotti 1993; unpubl. data).

Birds of prey have previously been documented incubating waterfowl eggs. However, these reports are of Black-headed Ducks (*Heterouetta atricapilla*), which are obligate brood parasites, laying eggs in Snail Kite (*Rostrhamus sociabilis*) and Chimango Caracara (*Milvago chimango*) nests (Weller 1968, Höhn 1975). The difference in egg sizes between those of Black-headed Ducks and kites or caracaras is not as pronounced as those we report here (see Weller 1968, Brown and Amadon 1989). We suspect that the female kestrel in this study could easily have moved the duck egg to one corner of the nest box or chosen to lay her eggs away from the duck egg. In either case, incubation of the duck egg was not required. It may be that the presence of this abnormally large egg in the nest was a "supernormal stimulus" (Tinbergen 1951), resulting in the pair's showing tenacious incubation behavior and being relatively successful at applying sufficient heat to an unusually large volume of eggs.

We lack information on whether the first pair of kestrels was usurped by the Bufflehead and whether the Bufflehead was in turn displaced by the second pair of kestrels. Erskine (1964, 1971) reported that Buffleheads had displaced other species and are themselves occasionally displaced, usually by passerines. Regardless, these observations suggest that there is competition for nest sites in our study area. However, occupancy of our nest boxes by kestrels during 1996 was only 38% (N = 376 boxes), and natural cavities were extremely abundant (Bortolotti 1994; pers. obs.). In addition, two nest boxes adjacent to box #99 were unoccupied, with the closest only 400 m away. We suggest that rather than there being intense competition for all nest boxes (see also Bortolotti 1994), there was a desirable quality associated with this particular nest box.

The habitat where box #99 is located consists almost entirely of young jack pine (*Pinus banksiana*). We propose that, because of the relatively young age of the forest, there may be a paucity of natural cavities in this immediate area but not on the study area as a whole. Additional evidence for limited nest sites in this particular area is that this nest box as well as the one 400 m away were occupied by Boreal Owls (*Aegolius fumeus*) in 1993, a species

that normally does not use nest boxes on our study area (Gerrard et al. 1996), presumably because of abundant natural cavities.

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